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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/885,811	06/19/2001	Richard W.D. Booth	110619CFB.US	4376

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EXAMINER	
NGUYEN, DUNG X	

ART UNIT	PAPER NUMBER
2631	3

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/885,811	BOOTH ET AL.	
	Examiner	Art Unit	
	Dung X Nguyen	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2 - 7* is/are rejected.

7)☒ Claim(s) *1* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawing Objection

1. Regarding figure 1, "CHORDIC CONVERTER" should be numbered as block 139 according to the specification, page 5, line 19. Appropriate correction is required.

Claim Objections

2. Claim 1 is objected to because of the following informalities:

- On line 9, "one of the output measurement signal and" should be deleted in order to be consisted with the specification;
- On line 10, "and" should be deleted;
- On line 11, "input measurement signals" should be changed to "input measurement signal" and add "the shifted input measurement signal", "output measurement signals" should be changed to "output measurement signal";
- On lines 12, after "components", "respectively," should be added.

The final version of claim 1 should be:

A method of generating feedback information in IQ form for linearity compensation of a communications transmitter using polar modulation and having a communications signal amplifier having an input signal and producing an output signal, comprising:

using the output signal, producing an output measurement signal;

using the input signal, producing an input measurement signal exhibiting varying phase and a substantially constant envelope;

shifting the input measurement signal by substantially 90 degrees to produce a quadrature measurement;

mixing input measurement signal and the shifted input measurement signal with output measurement signal to produce resulting in-phase and quadrature components, respectively, the in-phase and quadrature components representing a phase difference between the input measurement signal and the output measurement signal.

Appropriate correction is required.

3. Claim 2 is objected to because of the following informalities: On line 6, "modulator" should be changed to "demodulator". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> *A person shall be entitled to a patent unless –*
> *(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*

5. **Claim 3 rejected** under 35 U.S.C. 102(b) as being anticipated by Schanabl et al. (US patent # 5,905,760).

Regarding claim 3, Schanabl et al. teaches (see figure 1):

- Modulator (block 16 of figure 1) responsive to the data signal for producing modulated signals including a magnitude component and a periodic signal containing phase component (column 1, line 66 to column 2, line 6);
- Power amplifier (20 of figure 1) responsive to the magnitude component and a periodic signal for producing a desired communication signal (column 3, lines 25 – 27 and column 1. line 66 to column 2, line 18); and
- Feedback circuitry (blocks 24, 26, 28, 12 of figure 1) responsive to the communications signal and to the periodic signal for producing feedback components in quadrature relation, the feedback signal including information about a phase difference between the communications signal and the period signal (column 1, line 66 to column 2, line 49 and column 4, line 51 to column 6, line 15).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

7. **Claim 2 is rejected** under 35 U.S.C. 103(a) as being unpatentable over Schanabl et al. (US patent # 5,905,760), and further in view of Jones (US patent # 5,894,496).

Regarding claim 2, Schanabl et al. teaches (see figure 1):

- Polar modulator (block 16 of figure 1) to produce a phase-modulated signal (column 3, line 18 - 23);
- Power amplifier (20 of figure 1) for amplifying the phase-modulated signal to produce an output signal (column 3, lines 25 – 27); and
- Using an IQ demodulator (26 of figure 1) to produce feedback information (via blocks 28, 12, 14, 16, 20, 24), the demodulator receiving input signals as the input signal and the output signal, and producing as output signals in-phase and quadrature components representing a phase difference between the input signal and the output signal (see column 4, line 15 to column 5, line 7).

While Jones teaches (figure 2):

- I/Q modulate 28 to produce a phase modulated signal (column 5, line 48);
- Amplifiers 38, 40 for amplifying the phase-modulated signal to produce an output signal (column 5, lines 58 – 67);

- Using an I/Q demodulator (56) to produce feedback information (column 2, lines 54 – 65) for linearity compensation (column 1, lines 34 – 38 and column 2, lines 54 – 65), the demodulator receiving input signals as the phase-modulated signal and the output signal, and producing as output signals in-phase and quadrature components representing a phase difference between the phase-modulated signal and the output signal (see column 3, lines 14 – 24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Schanabl et al. and Jones to fulfill the limitations required by the instant claim invention for improving the communication system.

8. **Claim 4 is rejected** under 35 U.S.C. 103(a) as being unpatentable over Schanabl et al. (US patent # 5,905,760), and further in view of Jones (US patent # 5,894,496) and Liu et al. (US patent # 6,493,409 B1).

Regarding claim 4, as followed by the limitations analyzed in claim 3, Schanabl et al. differs from the instant claimed invention that it does not show wherein the feedback circuit comprises:

- First and second mixers;
- A first pair derived from the communications signal, a different one of the first pair of signals being applied to each of the mixers; and
- A second pair derived from the period signal, a different one of the second pair of signals being applied to each of the mixers;

Wherein the signals of at least one the first pair of signals and the second pair of signals are in quadrature relation to one another.

While Jones teaches (see figure 2) that I/Q modulator (28) connected to block 50 including blocks 56, 62, 64 and components 58, 62 for compensation the phase shift (column 6, lines 15 – 61).

And Liu et al. discloses (figure 10):

- First mixer (144) and second mixer (146);
- First pair of signals derived from the communications signal (I/Q paths), a different one of the first pair of signals being applied to each of the mixers;
- Second pair of signals (X_I and X_Q from blocks "sign"), a different one of the second pair of signals being applied to each of the mixers;

Wherein the signals of at least one the first pair of signals and the second pair of signals are in quadrature relation to one another.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Schanabl et al., Jones, and Liu et al. to fulfill the limitations required by the instant claim invention for improving the communication system.

9. **Claims 5 – 7 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Schanabl et al. (US patent # 5,420,536), and further in view of Jones (US patent # 5,894,496) and Wright et al. (US patent # 6,697,436 B1).

Regarding claim 5, as followed by the limitations analyzed in claim 3, Schanabl et al. further discloses (column 1, lines 55 – 60, column 2, lines 39 – 50 and column 4, line 14 to column 6, line 21):

- A predistortion table corresponding to a correction table for correcting the magnitude and about the phase component;
- Adaptation means responsive to the feedback signal components for adapting values of the correction table.

Schanabl et al. differs from the instant claimed invention that it does not show wherein the modulator analyzed in claim 3 further comprising:

- A correcting table for correcting the magnitude component and the phase component.

While Jones teaches (see figure 2) that I/Q modulator (28) connected to block 50 including blocks 56, 62, 64 and components 58, 62 for compensation the phase shift (column 6, lines 15 – 61).

And Wright et al. discloses:

- Correction table (block 52H of figure 3 and column 17, lines 41 - 57) for correcting the magnitude and the phase components (column 11, line 53 to column 12, line 42);
- APDCE (block 70 of figure 2) corresponding to the adaptation means responsive to the feedback signal components for adapting values of the correction table.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Schanabl et al., Jones, and Wright et al. to fulfill the limitations required by the instant claimed invention for updating to the compensation parameters (abstract of Wright et al.).

Regarding claim 6, as followed by the limitations analyzed in claim 5, Wright et al. further discloses that wherein the APDCE corresponding to the adaptation means is based on a statistical algorithm (column 47, lines10 – 14).

Regarding claim 7, as followed by the limitations analyzed in claim 6, Wright et al. further discloses that wherein the statistical algorithm is the least mean squares algorithm or LMS (column 33, lines 22 – 35).

Allowable Subject Matter

10. **Claim 1 would be allowable** if rewritten or amended to overcome the objection(s) under set forth in this Office action.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mitzlaff (US patent # 6,735,419 B2), Pellonperä (US patent # 6,690,743 B1), Gentzler et al. (US patent # 6,396,344 B1), Leizerovich (US patent # 6,353,359 B1), Thron et al. (US patent # 6,304,140 B1), Wessel et al. (US patent # 6,275,685 B1), Midya et al. (US patent # 6,240,278 B1), and Leizerovich et al. (US patent # 5,933,767) all teach about amplifier and signals related to amplifier.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung X. Nguyen whose telephone number is (703) 305-4892. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Ghayour Mohammad H. can be reached on (703) 306-3034. The fax phone numbers for this group is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3800.

DXN
May 13, 2004

JEAN B. CORRIELUS
PRIMARY EXAMINER
5/17/04